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Behind-Ventilated Facade Construction Plate

The invention refers to behind-ventilated facade construction panels, as they are particularly applied as large-board components with behind-ventilated fronts in above ground buildings story-high, prefabricated external walls. Apart from the cladding function (with consideration of all from the outside and/or inside working, effects mainly from the building design aspect they also have to fulfill load and/or reinforcing functions.

Such construction panels are well known, with one insulating intermediate layer between a outside (face) layer and a load-carrying concrete inner layer, as well as a backing ventilation cavity, which is with connected with the outside air. With the numerous composite panels this kind, outside spacer items or ribs connect behind external boards of cork or plastic foam insulation, forming air compartments connected to air ducts

through the load layer, which lies internal limiting wall of the plate reinforced concrete plate, is not or an only most insufficient of the plate parts given on both sides the air layer. That therefore stresses the opposite layers more or less in-plane, always with strong friction between the spaced apart bodies, as concrete ribs, insulating strips and such a thing lie together. If such plates are exposed now to unilateral strong temperature rise or cooling, then a kind of " bimetal effect " results from the different heat stretching and in addition also by the different shrinking behavior of the two bowls, which leads to a most unwanted curvature of the plate.

In order to remedy this deficiency and to make the layers compatible and sufficiently fixed in the normal direction and with good strength in the plate plane itself, this curvature effect preventing opposite-acting movable according to invention the arrangement so met that the two plate parts and the intermediate insulation layer at are together embodied at a central, limited area section by the backing ventilation cavity penetrating rigid connection, during around this central plunger the connection on both sides the backing ventilation cavity each other of the opposite board parts only by flexibly ductile

needle-shaped spacers is formed. Now different strains of the two plates caused by large temperature differences or by differential shrinkage cannot cause warping because, the two plates would have shear-free connection with the insulation. Rather to a large extent free lateral opposite-acting movement of the plates occurs on both sides the backing ventilation cavity with the new plate, whose layers are rigidly connected only in the area of the central anchor by the layers through. By the abolishment of the columns of chimney-forming partition walls in the air cavity, the occasionally useful benefit is achieved that one cannot build rectangular, thus square plates in with continuous aspiration effect after election highly or crosswise.

The described new characteristics of the facade panels now also the mounting plate elements serving for their construction is to adapt as well as the technique measures applied during the plate construction. In particular it is desired, for the plates, whose components before confirming the layers exhibit still no substantial form and position of stability to use after possibility such plunger and distance pieces their bringing into these first only defectively form and position-resistant plate building body

quickly or without malfunction of the opposite-acting position of the still loosely joined parts to take place can.

For this purpose in accordance with a further feature groups of hooks, which connect the mutual bowls under bypass of the intermediate layers, serve the invention than a rigid central plunger and whose at their *vertical* free shanks which can be placed into the face leaf parallel to the external surface serve to carry, which embody themselves when putting the shank ends into the face leaf with the reinforcing rods lying in it. The shanks permit thus with the construction of the plate on the formwork table a locating of the central plungers to most more simply and more quickly and way taking place without malfunction of the position of the parts at the bowls not confirmed yet. Escape the otherwise for such plunger mountings required additional connections with wires with the layer reinforcement and with the passing of additional fixture rods through for power transmission.

Likewise also ring the crosswise elastic spacer the special conditions of the described plate attached around the central plunger adapted, as for these holders to a large extent according to invention stainless steel corkscrew pins serve, their pointed end through the insulating layer and the ventilation cavity lying behind through into the face layer rises up and of the in the opposite interior bowl embedded other end to a stirrup-shaped

towards is, which puts as limiting stop against the area of the insulating layer cleared away from the ventilation cavity. The low cross section and form of the pins provide unhindered mobility for both layers parallel to each other. Their benefit continues to be it, that through the corkscrew-like formation of their point and the stirrup-shaped handle on the one hand inserted without malfunction of the connection understood concrete structure it is permitted and that on the other hand a stop in an educated manner is, that prevented that the pin is too far inserted.

Since the connections between the two layers of the plate are not to be loaded during the vibration and hardening of the concrete, then in accordance with a further feature of the invention when laminate moderate assembling the plate on the formwork table between the later backing ventilation cavity on both sides limiting layers and into the there gaps of the central plunger and the indemnity pins auxiliary bodies distance-holding are temporarily inserted, which are again removed after confirming the concrete bowls from the then freely becoming backing ventilation cavity. These distance bodies are thus put on the concrete layer lying down; becomes the isolation, which shifts central plungers as well as the indemnity needles (if necessary in the gaps) and then the concrete of the second bowl brought in and compresses. After out

going confirming of the concrete the distance bodies ent are fornt.

These distance holders can be trained in the most diverse kind. Proved successful e.g. board-shaped, rod-shaped, tubular or in any way formed prism tables solids, which are drawn after hardening of the concrete.

In addition, the distance bodies can be formed by bulk material in the form of sand, cinder or the like. The material is applied on the concrete of the lower bowl in the strength of backing ventilation intermediate space, remains up to hardening the concrete there, and result when taking the plate off from the formwork table out. This procedure can be supported by suitable measures, approximately by compressed air and such a thing. Keep to far from moisture is when concreting the container bed is by a position to water impermeable material (plastic sheets, oiled paper or such a thing) to be protected.

Furthermore the backing ventilation gap can be formed by placing hollow bodies with a filling from gas forming or liquid substances. Here e.g. inflatable synthetic closures (in the kind of air mattresses) can find to use, which are either component large, or in form and size out --

drawable distance body to be arranged and with those after confirming the concrete head or basing be opened.

The invention tied up schematic graphic representations of preferential execution form described. It represent:

Fig. 1 the total view of a finished facade panel after the invention,

Fig.2 the same plate cut open and partly away-chamfered drawn in somewhat smaller scale,

Fig.3 the plate after Fig. 2 in a typical side view,

Fig.4 the same plate on average seen from above,

Fig.5 the same plate in smaller scale in transparent drawn section,

Fig.6 one of the needle-shaped spacers in enlarged partial section representation by the plate,

Fig. 7 the same spacer in one shifted section around 90° ,

Fig.8 the section on the plate area with from two

Groups of hooks formed central plunger,

Fig. 9 the same in typical side view

Fig.10 a stirrup-shaped wire for the resistance of the shear forces serving group of the central plunger.

The represented to fulfill in their external dimensions and - limitations to the respective installation requirements adapted assembly fixture a large board component with behind-ventilated front is and has space enclosing in broadest sense -, basic and/or reinforced functions. The internal from concrete herge placed bowl 1 takes over the static stresses. It is reinforced more constructional after static requirements. The construction material and the dimensions (thickness or number) depend thereby likewise on the static requirements and after the relevant guidelines and regulations.

The thermal insulation by on the basic concrete cross section attached and insulating layer 2 achieved, e.g. by a sheet of foam polystyrene, basalt fibers or such a thing, adapted in the strength the requirements.

A water vapor diffusion from the inside after outside and condensation in the concrete core and/or in the insulating layer becomes by correct the from the building design aspect insulation arrangement (on of the lying exposed

surface of the interior bowl away-adjusted page) and by the diffusion resistance of the concrete core practically prevents. Being width unit it into the extreme layers of the insulation to a slight condensation to come, then can be eliminated this moisture by air circulating in the air space 3 between insulation and curtain or face leaf 4.

Finally the protection of the front, in particular the insulation, before influences of the weather, rain, hail, snow, and before mechanical effects, as well as a partial noise control (together with the core) and surface organization the front are achieved by this before-hung concrete bowl 4.

The adjustment of air space between the curtain bowl and the insulating layer takes place in the described way punctiformly via indemnity holders in connection with the ennobling. The suspension of the face leaf 4 takes place through the central plunger 5 and the ennobling 6 by the insulation through basic concrete core 1.

The front permits a large variation of the surface organization and structure also the lining material such as medium-sized mosaic, gap clinker etc., and meets the demands after sufficient protection from influences of the weather.

It is important that by the backing ventilation of the front each water penetrated from the outside or each moisture moved from the inside outward by diffusion can to be removed either from air circulating in air space as water vapour or at the wall of the air space run off and outward can flow off. Thus also is possible the use of large or completely steam-tight façade linings.

Beyond that the face leaf 4 by the central plunger 5 can expand and the ennobling 6 unhindered independently of the basic concrete core 1 and/or. shorten. Since the temperature of the face leaf is rather constant owing to circulating air over the whole bowl strength, also no warping danger consists.

The arrangement of the represented preferential form the used of the central plungers and needle parts show in the individual figures 6 to 10. The central plunger 5 (Fig. compares 5), attached in a limited district lain about central the composite slab, for rigid connection on both sides the backing ventilation cavity, lying bowl parts consists in the Ausfuehrungsform shown of two groups of hooks (Fig. 8,-10). The one in an educated manner of suitably in pairs arranged strong long u-shaped one holding 7, of them parallel to the disk area lying both sides 8 and 9 ever in more e/iner that

both reinforced concrete bowls 1 and 4 are embedded, while the intermediate diagonally running middle part 10 by the insulating layer 2 passes through and the backing ventilation cavity 3. The vertical shanks of the free end of 9 lying in the outside or face leaf 4 carry sicken 11, which engage during the establishment of the plate in the rods 12 of the structural steel lattice of this bowl running right-angled for shank direction and so that redundant make... other means of mounting. The transverse forces in the district of the central plunger are taken up shorter group by second, by hooks 13, which seize by the different layers and are suitably curved at their ends fitted with the establishment of the plate into the Vorsatzschale (Fig. 10).

~~Face~~ ^{face leaf 5}
~~Vorst~~ Vorsatzschale

Ring the needles 6 to the fixed, attached around the central plunger, put the indemnity between the outside and the internal scarf of the behind-ventilated facade panel are arranged on their end of 14 korkenzieherfoermig, while the other end is curved to a huegelfoermigen handle 15, which at the same time forms a limiting stop, with which the pinhead resulted in such a way, if the needle is pivoted with the establishment procedure by the insulation hindurch into the fresh concrete of the face leaf 4, covered itself on the first still openly lying afterwards then from the basic interior bowl, from the ventilation hollow, space cleared away area of the insulating layer 2 puts and thus the penetration depth of the needle clearly located (Fig. 6 and 7).

Patent claims:

hindurch
through

cork screw
shaped

stirrup
~~hook~~
shaped

(12)

P A T E N T A N W A e L T E

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Patent Claims

1. Behind-ventilated facade construction plate, with an insulating intermediate layer as well as a behind-ventilated space which contains a connection with outside air between an outside -- or face layer and a load-carrying exterior concrete layer, by the fact characterized that the two layer parts (1, 4) and the insulating intermediate layer (2) are connected together at a central, limited area section by a rigid connection (5) penetrating the backing ventilation cavity (3), while around this central anchor the connection of the board parts on both sides of the backing ventilation cavity to each other is formed only by flexibly ductile needle-shaped spacers (6).
2. Behind-ventilated facade construction plate according to claim 1, by the fact characterized that as rigid central anchors (5) groups of

,those
serve
hooks

(7, 13) under bypass of the intermediate layers the mutual layers connect and their a (7) at their into the face layer parallel to external surface vertical free shanks (9) sicken (11), which can be placed, carry, which embody themselves when putting the shank ends into the face leaf with the reinforcing rods (12), lying in it.

3. Behind-ventilated facade construction plate according to claim 1, end (14), mirror-image thereby characterized that as flexible spacers to a large extent rustproof corkscrew-shaped steel pins serve, by the heat-insulating layer and the ventilation cavity through into the face layer, behind it, rises up and of them in the opposite interior bowl embedded other end to a stirrup-shaped handle (15) is bent, which puts as limiting stop against the area of the insulating layer cleared away from the ventilation cavity..

4. Technique for the establishment from behind-ventilated facade construction plates to claim 1, by it characterized, when laminate moderate assembling the plate on the formwork table between those the later backing ventilation cavity limiting layers and into the there

between room of the central plunger and the indemnity needles auxiliary bodies distance-holding to be temporarily used, which are again removed after confirming the concrete bowls from the then freely becoming behind ventilated cavity.

5. Technique according to claim 4, thus characterized that as temporary one the distance holders rod-shaped, tubular or in any way formed prism tables solids are used.

4)

Technique according to claim 4, thus to be marked, this as before-ignoring distance holders is omitted gas or blowing bodies filled with liquid be used, their filling for freeing the backing ventilation cavity.

Technique according to claim 4, by the fact characterized that as before-ignoring distance holders shaped, on both sides by water impermeable interfaces before contact with the adjoining plate layers protected bulk material serves, which is for this for freeing the backing ventilation cavity from removal.

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Leerseite

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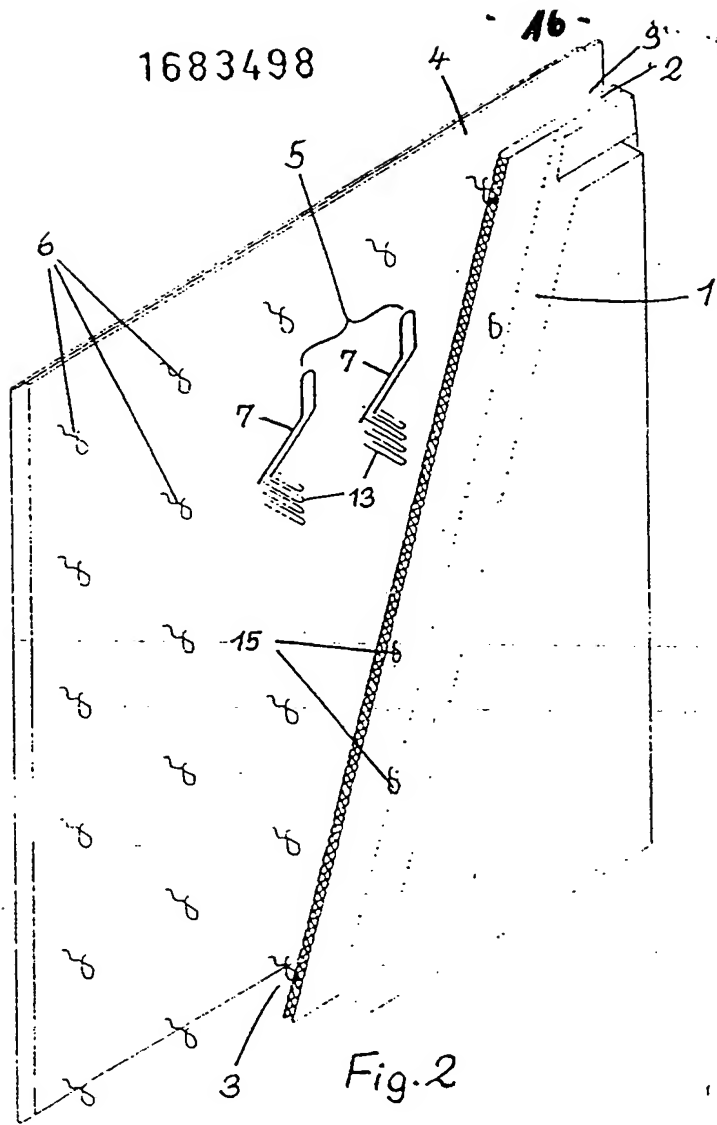


Fig. 2

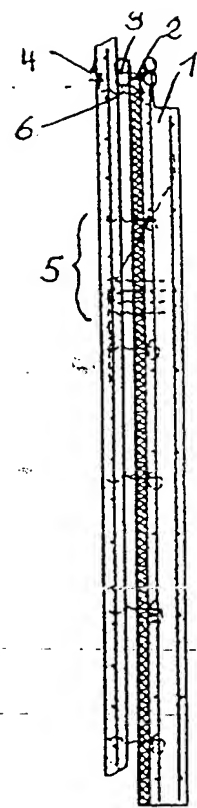


Fig. 3

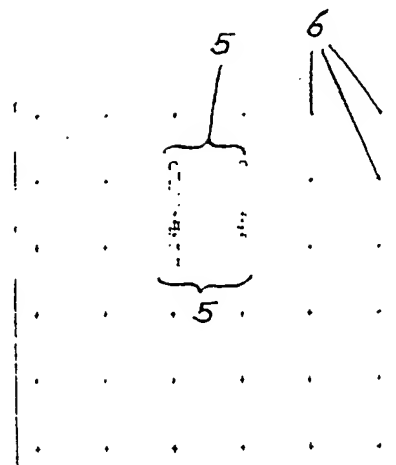


Fig. 5

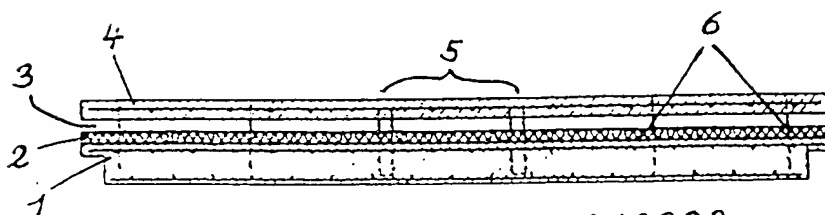


Fig. 4

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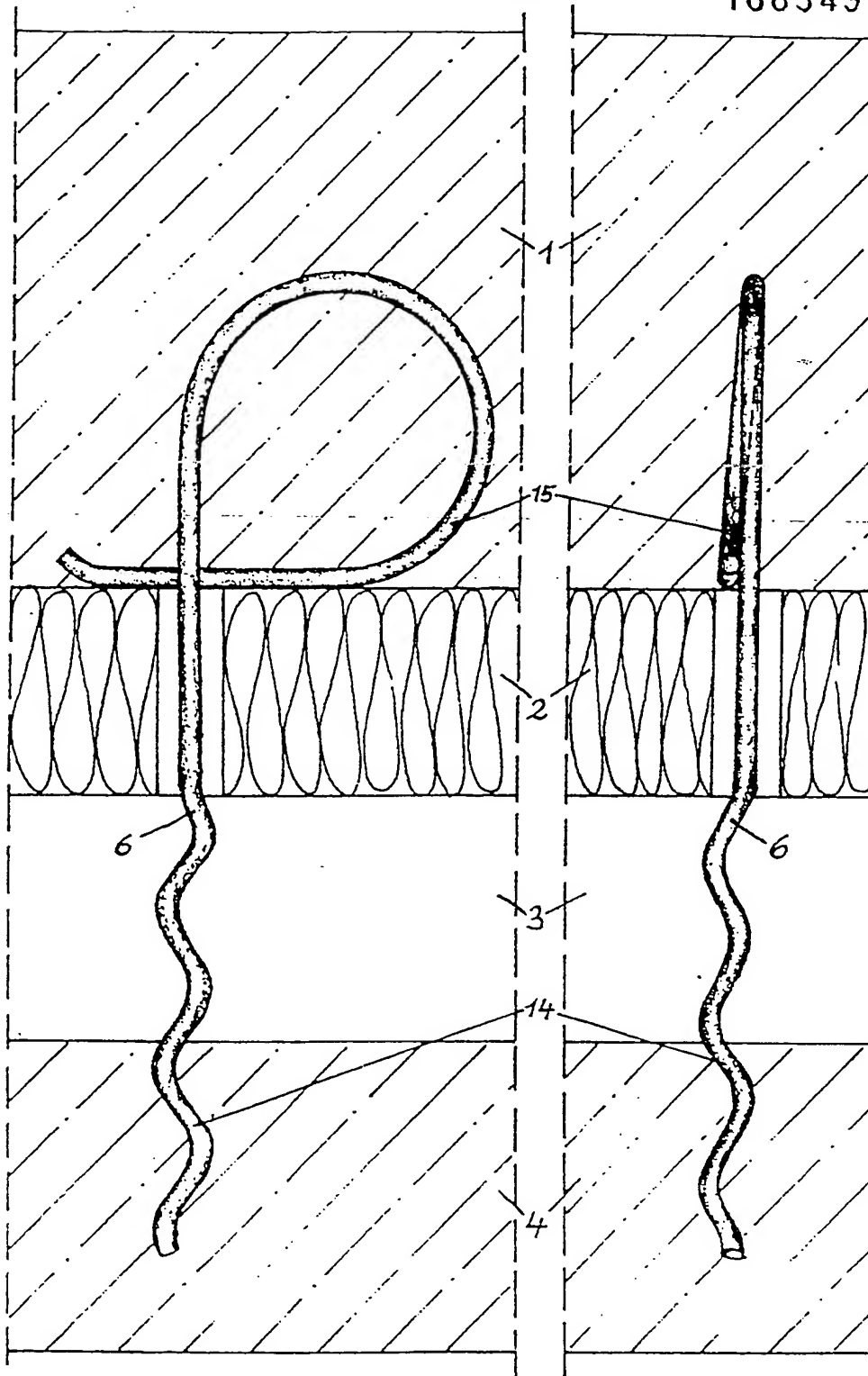


Fig. 6

Fig. 7

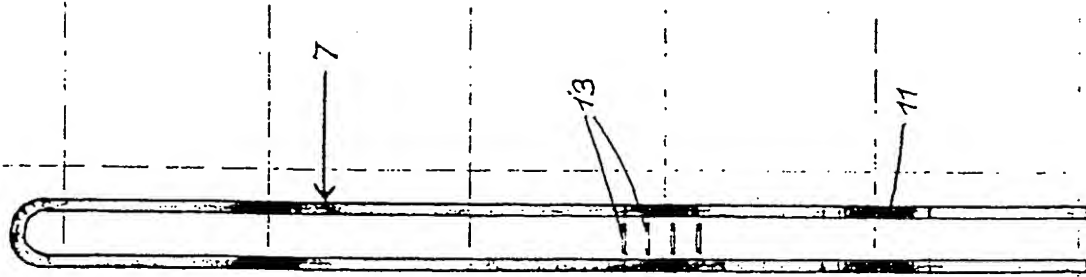


Fig. 8

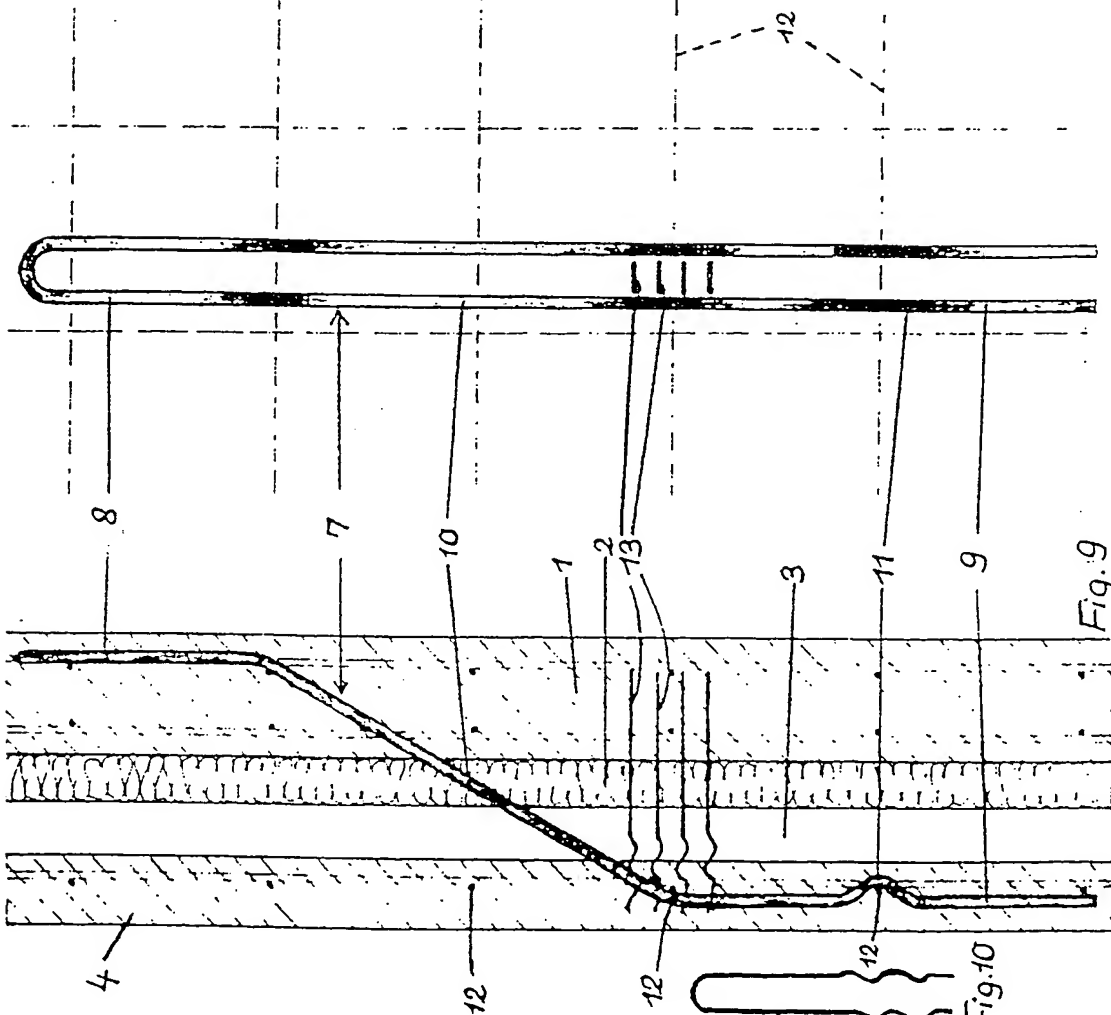


Fig. 9

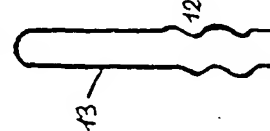


Fig. 10

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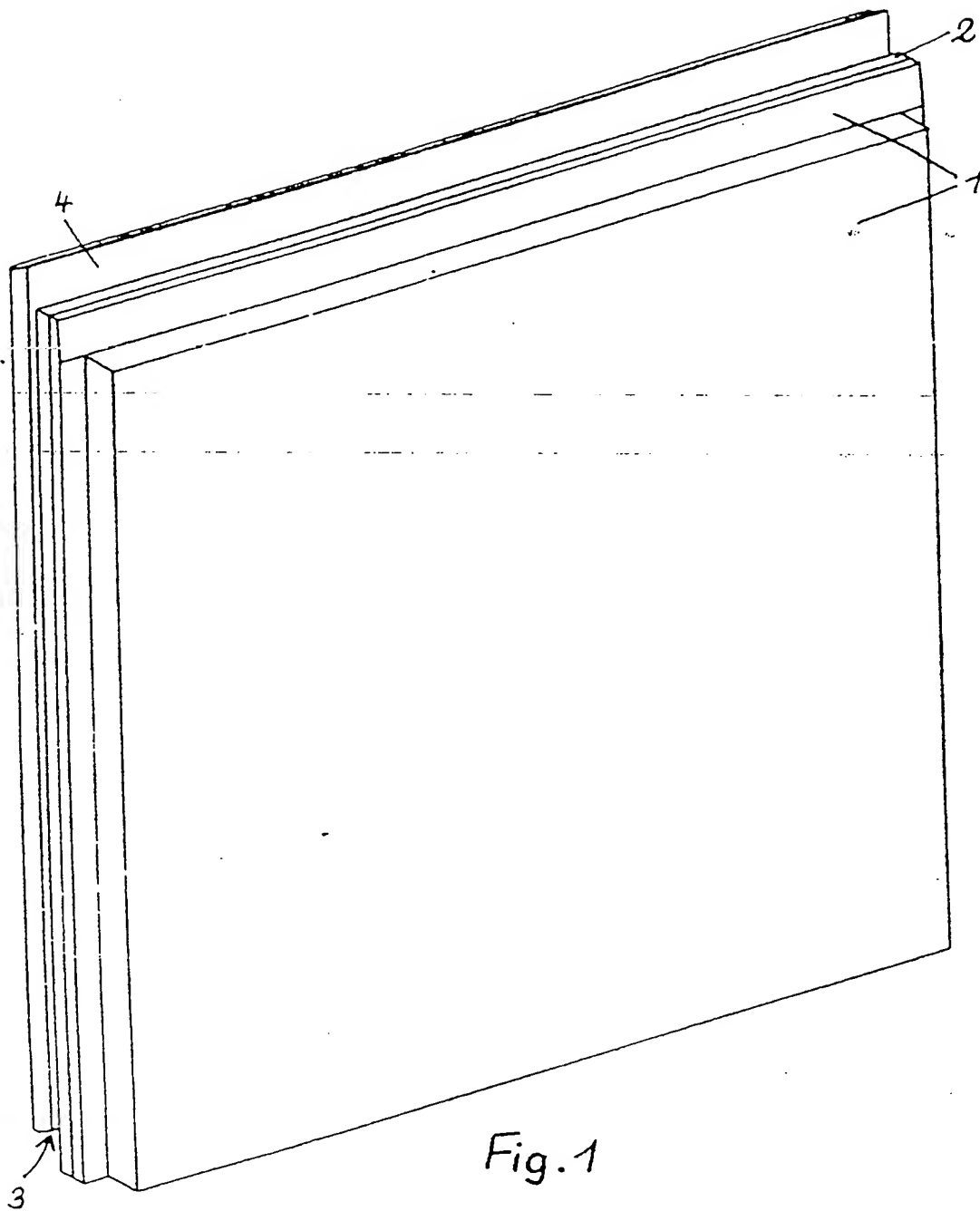


Fig. 1

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